ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ORIGINAL

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In the Matter of	)	
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Federal-State Joint Board	)	CC Docket No. 96-45
on Universal Service	)	

COMMENTS

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EXECUTIVE SUMMARY

The current universal service support mechanisms must be overhauled to comply with the Telecommunications Act of 1996. Specifically, universal service support, as it exists today, is not explicitly calculated but, rather, funded as part of a complex system of internal revenue flows - a system burdened by implicit, hidden subsidies intended, in part, to maintain the incumbent LECs' revenue streams. These mechanisms simply are not in compliance with the Act and can no longer be tolerated if competition is to develop.

MCI has proposed a four-step process to overhaul the current system and to replace it with a competitively neutral universal service funding mechanism. Specifically, (1) basic universal service must be defined; (2) the explicit universal service subsidy needed must be calculated, where one exists; (3) the universal service subsidy must be de-linked from the incumbent LECs' revenues and it must be available to all eligible carriers; and, (4) an auction process should be implemented for any areas not served.

The Hatfield economic model can and should be used to calculate the subsidy needed for universal service support. The Hatfield model determines the real amount of universal service support needed in a competitive environment as the difference between the total service long run incremental cost of providing the services included in the definition of universal service and the nationwide average rate for local service. Thus, universal service determined by the Hatfield model would comply with the principles espoused in the Act--namely, services would be available at just, reasonable and affordable rates; consumers in all regions of the Nation would have access to comparable services at comparable rates; and support would be specific and predictable. The Hatfield model also would provide the incentive and the funds needed to support infrastructure development and to maintain service quality by allowing LECs to recover the economic cost of providing quality service.

The Hatfield model computes the forward-looking cost of the most efficient network necessary to provide the services included in the definition of universal service and, therefore, it is technology neutral. It also is flexible because it measures costs at various levels of disaggregation and it includes a number of user-specific inputs. Finally, the Hatfield model is easy to use; it accurately captures all cost drivers; and it uses inputs that are publicly available.

The other proxy models on the record in this proceeding, BCM2 and CPM, are flawed and they are inferior to the Hatfield model. Accordingly, neither should be adopted.

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COMMENTS

MCI Telecommunications Corporation (MCI) hereby comments on the Hatfield Release 2.2, Release 1 (Hatfield model) filed on July 5, 1996 by AT&T, the Benchmark Cost Model 2 (BCM2) filed on July 3, 1996 by Sprint Corporation and U S West (collectively, the Co-Sponsors), and the Cost Proxy Model (CPM) filed by Pacific Telesis.

I. USE OF PROXY MODELS IN SETTING UNIVERSAL SERVICE SUPPORT

In the universal service context, the purpose of a proxy cost model should be to compute the forward-looking cost of a network, built using the most efficient technology, that will provide the services and functions included in the definition of universal service. Once the forward-looking cost of the efficient network is determined, universal service support can be computed as the difference between the cost of the service and an acceptable rate, which MCI advocates should be set at the nation-wide average local service rate. Support set at this level would allow local exchange carriers (LECs) to charge rates that reflect their costs, while also ensuring that rates remain affordable for all consumers, including those in high cost areas.

In addition to accurately estimating the forward-looking cost of the efficient network, the proxy cost model must be easy to use. This requires that the model must accurately capture all cost drivers. It also must use inputs that are publicly available so that <u>all</u> parties will be able to examine the model effectively.

The three models about which the Commission is currently seeking comment all assume that the definition of universal service includes single party service to the first point of switching, local usage, touch tone, white pages listings, and access to 911, E911, operator services, directory assistance, and telecommunications relay service. They differ in their approach to modeling the cost of the network and in the inputs necessary to compute that cost. As demonstrated below, the Hatfield model, which is based entirely on publicly available data, presents the most accurate estimate of the cost of providing local service. It also is the only model which allows the user to input directly such important variables as depreciation rates and cost of capital. Thus, the Hatfield model should be adopted by the Joint Board and the Commission to set universal service support.

II. HATFIELD MODEL

The Hatfield model estimates the economic cost of providing basic telephone service to all consumers in the United States. Although the current model does not compute the universal service funding requirement, further development of the Hatfield model is in progress which will allow users of the model to compute directly the universal service funding requirement. A description of the universal service computation is being filed with AT&T's comments filed today, and the model and results for all states will be filed shortly. With the addition of this feature, the Hatfield model will provide all the tools the Commission needs to estimate the cost of the network and to compute the universal service funding requirement.

The Hatfield model uses seven modules to compute the costs of the network. The Input Data File module contains data on households, businesses, terrain, land area, and the location of central offices. This data also is used in the other modules. The Line Multiplier Module computes the number of residence and business lines in the individual census block groups (CBGs). The Data Module calculates feeder, sub-feeder, and distribution cable lengths.[1] This module is superior to the approach taken in the original BCM because it assumes both that feeder cable extends into the CBG, rather than merely to its edge, and that the number of distribution legs varies by density, with the lower density CBGs having fewer distribution legs than the more dense CBGs. Accordingly, the Hatfield model more accurately reflects the configuration of a real network. The Loop Module estimates the loop materials cost for each CBG by determining the most efficient feeder technology and the feeder capacity necessary based on outputs from the Data Module and inputs on cable fill factors. It then estimates a per foot investment based on user-specified list prices and discount factors. The Wire Center Module computes the costs associated with switching, signaling, interoffice transport, and operator services facilities, based on data from the previous modules and user-specified assumptions on traffic and distribution, and on the costs of switches and other equipment. The Convergence Module combines the investment computed in the Loop and Wire Center Modules and adds investment in serving area interfaces, interfaces between feeder and distribution cables and between distribution cable and subscriber drops, the subscriber drops, and the network interface devices. It also computes the structure costs of the cable - the cost of installing loops, and the associated poles, conduits, and manholes. The Expense Module takes the investment determined by the Convergence Module and converts

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1 The Data Module and Loop Module are derived from BCM+, a revision of the original BCM, developed and copyrighted by MCI, which allows the user to specify values for a number of the inputs which were "hard-coded" in BCM.

it into monthly operating costs based on user-specified asset lives and capital cost. It also adds on certain non-plant specific expenses, such as retailing.

For the most part, the criticisms of the model made by the LECs do not concern the validity of the model. Rather, the LECs dispute the underlying basis of the Hatfield model namely, that the model should compute the cost of the most efficient network. Thus, the LECs claim that the Hatfield model does not reflect their existing networks with respect to technology, design, or costs. While this may be true, it is not relevant because the Hatfield model computes the cost of the efficient network, not the cost of the existing network.

In addition, the LECs claim that the Hatfield model incorrectly uses current depreciation lives and cost of capital. As an initial matter, the Hatfield model for the most part uses the depreciation lives and cost of capital which have been found to be appropriate by the Commission and the state commissions. There is no evidence that they are incorrect on a forward-looking basis. In any case, the Hatfield model is structured so that both of these inputs can be easily modified, if necessary.

In fact, one of the primary advantages of the Hatfield model over other models is that it is designed to provide users with the maximum flexibility in computing network costs by allowing them to vary a number of the inputs to the model. In addition, the Hatfield model, more than either of the competing models, follows the Total Element Long Run Incremental Cost (TELRIC) principles that the Commission determined were appropriate in its interconnection proceeding.[2] Thus, the Hatfield model should be adopted by the Joint Board

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2 See Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, First Report & Order, CC Docket No. 96-98, FCC 96-325, adopted August 1, 1996, released August 8, 1996.

and the Commission as the basis for computing the universal service funding requirement.

III. BCM2

BCM2 was filed by Sprint and US West as a modification of the original BCM.[3] Allegedly, BCM2 addresses several criticisms that were made of the original model in this docket. While some of the modifications improve the model, a number of critical changes still have not been made. MCI's specific comments are infra.

a. Improvements to BCM2

The original BCM did not include data on the number of business lines. This resulted in a higher cost per loop because the model did not capture the economies of scale that would occur if local plant were sized to provide both residential and business service. BCM2 includes the number of business lines and, therefore, it should more accurately estimate the cost of local loops. However, the reasonableness of the estimate cannot be verified because the number of business lines in each CBG is derived from an unidentified "public source." The Hatfield model also uses data on the number of business lines by CBG, but its source is publicly available; a November 1995 Dun and Bradstreet survey.[4]

BCM2 attempts to improve the calculation of structure (i.e., conduit and duct) and installation costs for cable and wire facilities (C&WF), which were calculated under BCM

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3 BCM was sponsored by MCI, Sprint, US West and NYNEX.

4 The original BCM also had a problem with lines per household, in that it designed the network to provide only one line per household. While this is the number of lines for which universal service support should be provided, exclusion of multiple lines per household fails to capture the economies of scale that may result from those multiple lines. BCM2 correctly adds lines per household as a user input variable. Hatfield has always included this variable as a user input.

by applying a single factor to the C&WF investment. Thus, for example, if structure and installation costs were 30 percent of C&WF and there were $100 of cable investment, the structure and installation costs computed by BCM would have been $30. This would result in proportionately higher structure costs when a bigger cable is used, even though structure costs vary more by foot than by cable size. BCM2 attempts to correct this calculation of placement costs by separately calculating cable costs and structure costs. However, BCM2 uses a structure cost multiplier that increases with cable size and it applies a fixed per foot charge for pulling cable into conduit.[5] Not only is this approach too simplified, it appears to rely on historical LEC relationships of structure cost to cable investment for the factors used. The Hatfield model, by contrast, computes these structure costs in a more disaggregated manner, calculating buried and underground cable structure costs separately, computing separately the costs of poles for fiber and feeder, and including the cost of power and siting for digital loop carrier (DLC). Thus, the Hatfield methodology more accurately captures the differences in structure costs for the different types of plant.

BCM2 adds cost components (e.g., pedestal, drop wire, and network interface device that were not included in the original BCM. These components are necessary pieces of the local loop and should be included. Hatfield also includes these network components, as well as other necessary pieces of equipment, such as Serving Area Interfaces (the patch panels in

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[5] The structure cost multiplier is 1.0 for copper cables of less than 400 wire pairs, 1.2 for cables with between 401 and 900 wire pairs, 1.3 for cables with between 901 and 1500 wire pairs, and 1.4 for cables with more than 1500 wire pairs. Similarly for fiber cables, the factor is 1.0 for cables with fewer than 60 fibers and 1.2 for cables with more than 60 fibers. The cost per foot to pull cable is set at $0.77. No explanation is given in the BCM2 documentation for any of these factors.

the pedestals, where the distribution is connected to the drops).

Although BCM2 allegedly includes an "enhanced switching module," it is not clear that the "enhancement" is an improvement. As an initial matter, the way in which it is "enhanced" is not documented. In the original BCM, the switching module assumed a constant fixed switch cost of $647,526 and a cost per line of $238.87. This module was based on data from 1990 for one type of switch. The BCM2 documentation does not specify the source of the new switching data. The cost of the switch per line, however, is now $100, and the fixed costs vary by switch size: $250,000 for a remote switch ; $400,000 for a switch of between 10,000 lines and 60,000 lines; $600,000 for a switch of between 60,000 and 100,000 lines; $900,000 for a switch of between 100,000 and 500,000 lines; and $1,500,000 for a switch of more than 500,000 lines. It is not clear whether this switching module reflects more than one type of switch. In any event, it is very similar to that in the original BCM since it simply calculates a fixed cost and per-line cost for the switch.

The Hatfield model, in contrast, sizes the switch in each office by considering the actual traffic originating and terminating in the office. It then determines the total switching investment necessary, including land, buildings, power and all other relevant investments, by selecting the switch type and size to best meet that demand. Thus, the Hatfield model's switching module more accurately captures the cost of the switch, including all the additional investment associated with switches.

BCM2 employs a more detailed method of determining expenses from investment than BCM, using different expense factors for different categories of plant. However, this means that if the assumptions concerning these categories of plant, such as depreciation life or cost of capital, are changed, a separate computation must be performed to determine the effect of the change on the cost factors. Thus, although the refinement of the methodology improves the BCM model, it would be a further improvement if the disaggregated methodology in the Hatfield model were used. The Hatfield model permits the user to select different depreciation schedules for various plant categories, to apply expense factors on a plant category-specific basis, and to directly calculate those expense categories that vary with number of lines (e.g., billing, customer service, network operations) on a per-line basis. The Hatfield model permits the use of a much wider range of assumptions as to capital costs and operating expenses. Thus, the Hatfield model permits the user to independently vary such cost drivers as depreciation lives, cost of money, tax rates, and capital structure and, therefore, gives users of the model more flexibility to change relevant variables.

BCM2 contains a modification to the distribution architecture in densely-populated urban areas to better reflect the cost of plant placement in these areas. This appears to have been achieved by computing a weighted average of aerial and buried cable placement costs that varies for distribution, feeder, and fiber cable, and varies within each of those three by population density. This modification should more accurately reflect the different cost characteristics by area. By making this change, the developers of BCM2 are conforming their model with the practice of the Hatfield model, which already reflects the higher cost of plant placement in urban areas.

Some commenters objected to the BCM's assumption of a uniform distribution of population, especially in rural areas, as unrealistic. To adjust for this, BCM2 assumes that the population in the less densely populated CBGs will lie within a given distance of the road network, which effectively reduces the land area served and, thus, the loop plant in those areas. This modification to BCM2 should result in a more accurate estimate of costs in less densely populated CBGs.

BCM2 caps investment in wireline loops at $10,000 to reflect the fact that certain areas could more economically be served by wireless technologies. This modification should result in a more technologically neutral estimate of network costs. However, it is important to note that BCM2 does not model the cost of wireless technologies; it simply asserts that at any investment level above $10,000 per household, a wireless network would be less expensive. Nor does it allow the cost of a wireless network to exceed $10,000 per household. A further refinement that should be considered is to model the costs of a wireless network, at least for the less densely populated areas.

b. Further Changes Needed in BCM2

In order for BCM2 to be a more accurate cost model, other features must be changed in addition to those discussed in the previous section. First, BCM2 assumes that all DLC systems are provided using a non-integrated technology, i.e., it does not allow the digital loops to be plugged into the switch directly at the DS-1 level. This, however, is not the current practice and, thus, is not a forward-looking technology. The Hatfield model uses Integrated DLC throughout the areas served by digital loops. In addition, BCM2 models DLC investments in a very simplified manner. A superior approach is that used in the Hatfield model, which builds these investments from the ground up, including siting of the remote terminals, power, and all relevant investments in electronics. The Hatfield model thus explicitly incorporates more of the cost drivers of the network.

BCM2 also should be further modified with respect to distribution cables. BCM2 extends feeder plant into each CBG and places more distribution cables so that service is provided along each "lot line." Although it is an improvement in the model to extend feeder plant into each CBG, because this more accurately reflects network engineering practice, it is not clear that distribution would need to run along "lot lines" in every area. Rather, because distribution is more expensive, in general, than feeder, it can be assumed that feeder would be used as long as there is sufficient traffic to aggregate onto the feeder. This would reduce the length of distribution cable, which would reduce the need for repeaters. Thus, although the BCM2 method may be reasonable for urban and suburban areas, it might overstate the need for distribution in less dense areas. Accordingly, BCM2 must be further modified to have distribution follow "lot lines" only in suburban and urban areas.

In any event, the Hatfield model considers a number of factors that are not included in BCM2 which make the Hatfield model a superior tool both for estimating universal service costs and for estimating the costs of unbundled network elements. First, BCM2 does not attempt to model interoffice network costs. Instead, it simply applies a 3% factor to all other investments to estimate the amount of interoffice investment.[6] The Hatfield model, however, calculates the actual investment in interoffice facilities required to provide service by calculating the amount of traffic between individual wire centers.

BCM2 does not attempt to model the costs of the SS7 signaling network, which is used to set up the path for all calls, including local, and, therefore, should be included in the

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6 In fact, the source of the 3% factor appears to be the Hatfield model, as interoffice plant accounts for about 3% of investment in that model.

cost of universal service. Hatfield, however, considers this cost and estimates separately the costs of signaling links, STPs, and SCPs.

BCM2 is designed only to estimate the cost of basic universal service. Thus, BCM2 cannot take into account the economies of scale and scope where they exist, as pointed out by NCTA.[7] The Hatfield model accounts for economies of scale and scope where they exist by calculating the cost of unbundled network functions and then building the cost of universal service from these functions.

Finally, BCM2 relies exclusively on ARMIS data in calculating expenses, including actual customer operations and corporate operations expense on a per-line basis, and, therefore, BCM2 incorporates all of the inefficiencies that exist in the embedded costs for these functions. While Hatfield also relies on ARMIS data for some expense categories, incremental cost information is used whenever publicly available. Thus, the Hatfield model's cost estimates better reflect the forward-looking costs of the local network.

c. Unnecessary Changes Made in BCM2

BCM2 also includes several changes to the original BCM which appear to make little difference in overall results. For instance, BCM2 makes the break point between copper and fiber a variable specifiable by the user, as the Hatfield model does. While there is some dispute about the distance at which this cross-over occurs -- the original BCM set the distance at 12,000 feet, while Pacific's CPM uses 9,000 feet as the cross-over point -- the distance used should reflect the best engineering practice. It should not be up to the LEC's discretion. Only in this way will the model produce the forward-looking cost of the network.

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7 See NCTA Comments, filed April 12, 1996, at Attachment A, p. vi.

BCM2 also adds variables to account for the impact of slope on outside plant costs. Specifically, BCM2 incorporates data on the minimum and maximum slope in the CBG, and increases the length of loops by 10 percent if the minimum slope in a CBG exceeds a threshold value; by 5 percent if the maximum slope in a CBG exceeds a different threshold value; and by 20 percent if both minimum and maximum slope exceed those values. However, BCM2 provides no justification or explanation of either the threshold values or the level of increased cost associated with those thresholds. It is not clear that slope has a significant effect on plant costs because highly-sloped territory in the less densely populated areas will likely be uninhabited. In any case, the assumption that the population is uniformly distributed over the CBG area likely overstates the amount of plant needed in a manner that offsets any effect of slope on plant length.

BCM2 adds as a user-specifiable input both the depth at which the water table occurs and the amount by which it increases placement costs for buried/underground cable. The cost estimates supplied by the sponsors of BCM2 assume that these placement costs increase by 30 percent if the water table is within 3 feet of the surface. It is not clear that water table depth changes the manner in which outside plant is placed, nor that it changes the cost of placing plant. Thus, it is not clear that the depth of the water table warrants inclusion in a cost model.

IV. THE CPM SHOULD NOT BE USED

The CPM suffers from two major drawbacks that render it unusable for estimating the universal service obligation. First, it employs proprietary data on the location of all residential and business customers. This will severely limit the ability of parties to assess the model.

In addition, collection of this data may not be feasible as more companies enter the local exchange market because the data would have to be collected from all companies. Thus, the administrative difficulties of using this model would be even greater as competition develops.

Second, the model has been developed only for California. Interested parties in this proceeding therefore cannot determine how this model performs for the rest of the country. For example, it cannot be determined whether the model provides consistent, reasonable results for all states, or if it captures features specific to California. Until nation-wide results have been obtained, the Commission cannot seriously consider use of this model for setting universal service support.

V. CONCLUSION

Use of a proxy cost model would ensure that the LECs receive the support they need to provide local service at affordable rates, while promoting competition by eliminating the LECs' historical inefficiencies from the fund. To effectively serve these purposes, however, the model must accurately reflect the forward-looking cost of the most efficient network, including all its components, and it must allow model users to modify key inputs. It also must be based on publicly available data. Only one of the models in this docket, the Hatfield model, meets these criteria. Thus, the Commission should compute the universal service support requirement based on that model.

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